

**Catalogue of American Amphibians and
Reptiles 918.**

McCranie, J. R. 2018. *Craugastor stadelmani*.

***Craugastor stadelmani* (Schmidt)
North-Central Honduran Montane
Streamside Frog**

Eleutherodactylus milesi: Schmidt 1933:19 (in part).

Eleutherodactylus stadelmani Schmidt 1936:44 “from Portillo Grande, Yoro, Honduras, at 4800 feet altitude.” Holotype, Museum of Comparative Zoology at Harvard University (MCZ) 21290, an adult female, collected by Raymond E. Stadelman on 28 May 1934 (examined by author).

Eleutherodactylus milesi / Population System: McCranie et al. 1989:487 (in part).

Eleutherodactylus (Craugastor) stadelmani: Lynch 2000:150.

Eleutherodactylus “milesi”: Espinal et al. 2001:105.

Craugastor stadelmani: Savage 2002:551. By implication.

Craugastor stadelmani: Frost et al. 2006:360. First use of combination in print.

Craugastor (Campbellius) stadelmani: Hedges et al. 2008:34.

CONTENT. No subspecies are recognized.

DESCRIPTION. *Craugastor stadelmani* is a moderately small species of *Craugastor* (for specimens from the state of Olancho, Honduras: in ten adult males, snout-vent length [SVL] range = 27.3–31.6 mm, mean [standard deviation] = 29.5 mm [\pm 1.3 mm]; in ten adult females, SVL range = 35.4–41.5 mm, mean [standard deviation] = 38.4 mm [\pm 1.6 mm]; for specimens from the state of Yoro, Honduras: in six adult males, SVL range = 29.1–33.1 mm, mean [standard deviation] = 31.2 mm [\pm 1.6 mm]; in seven adult females, SVL range = 33.2–47.4 mm, mean [standard



FIGURE 1. Adult female of *Craugastor stadelmani* from 2.5 airline km NNE of La Fortuna, northwestern Yoro, Honduras. Photograph taken by James R. McCranie on 8 April 2010.

deviation] = 40.9 mm [\pm 4.9 mm]). Description based on composite of 16 males and 17 females from the states of Olancho and Yoro, Honduras. The head is moderately long and broad (head length/SVL in adult males = 0.377–0.433, in adult females = 0.390–0.437; head width/SVL in adult males = 0.381–0.420, in adult females = 0.391–0.417). The snout is nearly rounded to rounded in dorsal aspect and rounded to nearly vertical in lateral profile. The top of the head is flat. The canthal ridges are angular and the loreal regions are concave. The upper lips are not flared, except in some large females. The nostrils are directed posterolaterally and are situated at a point slightly less than two-thirds the distance between the anterior borders of the eyes (interorbital distance/eye length in males = 0.587–0.829, in females = 0.686–0.848) and the tip of the snout. Cranial crests are absent. The upper eyelids are prominent (eyelid width/interorbital distance in males = 1.034–1.240, in females = 1.026–1.222). Tympana are usually not visible externally; rarely the tympana are barely visible externally in males.

The upper arms are slightly more slender than the moderately robust forearms. A transverse dermal fold is absent or weakly developed on the upper surfaces of the wrists.



MAP. Distribution of *Craugastor stadelmani*. The open circle marks the type locality, the closed circles represent other localities (specimens examined by author), and the open square represents a literature record (specimen not examined by author; see Holm and Cruz D. 1994).

No vertical dermal folds are present along the elbows. Tubercles are usually absent, or tubercles occasionally arranged in an irregular series along the posterior ventrolateral edges of the forearms, but tubercles not developed into a dermal ridge. The finger discs on fingers III–IV are broadly expanded (disc on Finger III about 2.0–3.3 times with of digit just proximal to disc). The disc covers on fingers I–II are rounded, but are ovoid apically, those on fingers III–IV are rounded (even; see Savage 1987). The disc pads on fingers I–II are ovoid, those on fingers III–IV are broadened. The subarticular tubercles on the fingers are round to ovoid and elevated (globular). Supernumerary tubercles are absent on the fingers. The palmar tubercle on each hand is elevated and ovoid (sometimes bifid), and is about as large as, or slightly larger than the thenar tubercles. A few small accessory palmar tubercles are present. The thenar tubercle

on each hand is suboval, elevated, and visible from above. Each prepollex is not enlarged, but nuptial thumb pads bearing granular, colorless nuptial excrescences are present in adult males. Relative length of the fingers is $I < II < IV < III$. The fingers are not webbed, but bear lateral keels.

The hind limbs are relatively long (shank length/SVL 0.500–0.622 in males, 0.547–0.621 in females; foot length/SVL 0.487–0.576 in males, 0.474–0.573 in females). The heels do not make contact with each other when the hind limbs are held together towards the cloacal opening at right angles to the body. A weak vertical dermal fold is present on the outer lateral edge of each heel. Each heel has about 20–40 tiny to moderate-sized tubercles. Tubercles or dermal ridges are absent along the posterior ventrolateral edge of each tarsus. An inner tarsal fold is absent. The subarticular tubercles on the toes are ovoid and glob-

ular. Supernumerary and plantar tubercles are absent on the toes. Each inner metatarsal tubercle is elongate, elevated, and visible from above. The outer metatarsal tubercles are small, rounded, and elevated. Relative toe length is $I < II < V < III < IV$. The toe discs on toes II–V are broadly expanded (*sensu* Savage 1987) with disc on Toe IV about 2.2–3.3 times the width of the digit just proximal to the disc. Disc covers on the toes are rounded (even; see Savage 1987) and the disc pads on the toes are broadened. The modal webbing formula of the feet is I 2–2 $\frac{3}{4}$ II 2–3 $\frac{1}{2}$ III 3–4 IV 4–2 $\frac{1}{2}$ V. Lateral fleshy fringes that fold ventrally are present on the unwebbed portions of toes II–IV, lateral keels are present on unwebbed portions of remaining toes. An inguinal gland is usually faintly visible.

The vent opening is directed posteroventrally near the upper level of the thighs and the skin surrounding the vent is tuberculate. The skin of the dorsal surfaces commonly is wrinkled, not granular to moderately granular, with numerous tiny to moderate-sized tubercles on top of the head and on the anterior portion of the body. The tubercles on the flanks and posterior portion of the body are larger than those on the remainder of the body. The skin on the upper eyelids is wrinkled with numerous small to large tubercles. A row of raised skin, usually tuberculate and either continuous or discontinuous, forms postocular ridges that extend to the level of the scapular region. Dorsolateral ridges are absent on the body, although a linear series of tubercles can group together to form short ridges dorsolaterally and on the mid-back region. The skin on the chin, throat, and chest is smooth. The skin of the belly and ventral surfaces of the thighs is usually slightly wrinkled, almost smooth, although moderately wrinkled in those with more granular dorsal surfaces. The ventral disc is absent to indistinct in both sexes. Each iris is horizontally elliptical. The palpebral membrane is translucent and unpatterned. The tongue is ovoid, not notched posteriorly, and is free posterior-

ly for about one-fourth of its length. The vomerine tooth patches are on elevated, ovoid to nearly triangular-shaped ridges located posteromedially to round, tear-shaped, or ovoid choanae. Each tooth patch is separated by a distance roughly equal to, or slightly less than the width of either patch in males, and by a distance much less than the width of either patch in females. Maxillary teeth are present. Males have paired vocal slits and a single, median, subgular vocal sac, but that sac is not evident externally. All of the above data were gathered by the author and published as descriptions by McCranie and Castañeda (2007) and McCranie and Wilson (2002), or used to compare *Craugastor stadelmani* to other species in the *Craugastor milesi* species group (McCranie and Wilson 1997). An SVL of 40 mm, a HW/SVL ratio of 0.450, and a shank length/SVL ratio of 0.613 were given for the female holotype (MCZ 21290) by Schmidt (1936), though the HW/SVL ratio falls outside the ratios I obtained for 17 adult female specimens of *Craugastor stadelmani*.

Color in life of an adult male was as follows. USNM 497171 had the dorsal surfaces of the head and body medium brown, some dark brown ridges and large tubercles on the body. The dorsal surfaces of the limbs were pale brown with dark brown crossbars and the dorsal surfaces of the tibiae were banded brown and dark brown. The upper lips were pale brown with darker brown bars. The flanks were pale gray with white spots. The ventral surfaces were pale gray and flecked with brown, especially on the chin and throat. Each iris was black with dense pale brown flecking. An adult female (USNM 497172) had all dorsal surfaces medium brown with some ridges and large tubercles on the body dark brown. Dark brown crossbars were present on the limbs. Dark brown upper lip bars were also present. The flanks were pale brown and densely flecked with medium brown. A pale brown interocular bar was also present. The posterior surface of the thigh was dark brown, as was the chin and chest. All ven-

tral surfaces were pale brown with medium brown flecking. Flecking was especially noticeable on the chin and throat regions. The belly and the ventral surface of the thigh were lemon-yellow and flecked with brown. Each iris was grayish brown and flecked with pale brown.

DIAGNOSIS. The following combination of characters will distinguish *Craugastor stadelmani*, a member of the *Craugastor milesi* species group, from all other Honduran species of *Craugastor*. A tympanum usually is not visible externally, or rarely is extremely indistinct. An inner tarsal fold is absent. The toe webbing is basal with the modal webbing formula I 2–2¾ II 2–3½ III 3–4 IV 4–2½ V. The toes have lateral fleshy fringes that fold ventrally on the unwebbed portions of toes II–IV. The dorsal surfaces of the body and limbs contain numerous tiny to moderate-sized tubercles. The species is known to reach 33.1 mm SVL in males and 47.4 mm SVL in females. Of the other species of streamside frogs of the *Craugastor milesi* species group known to occur in Honduras, only *Craugastor chrysozetetes*, *Craugastor cruzi*, and some specimens of *Craugastor epochthidius* are known to have laterally, ventrally folding fleshy fringes on the unwebbed portions of the toes. *Craugastor chrysozetetes* has larger males (known to reach 41 mm SVL) and has more toe webbing in both sexes (modal webbing formula I 1½–2 II 1½–2½ III 2–3½ IV 3½–2 V; see McCranie 2017). *Craugastor cruzi*, known only from two males, has a distinct and complete, relatively wide middorsal white stripe on the body, a highly unusual character state in males of the *Craugastor milesi* species group (vs. pale stripe absent in males, occasionally present, but, narrow and incomplete in female *Craugastor stadelmani*). Specimens of *Craugastor epochthidius* with fleshy folds on some toes have less toe webbing (modal formula III 3–(4–4¼) IV (4+–4¼)–(2½–2¾) V); *Craugastor epochthidius* is a smaller species (males to 27 mm SVL and females to 37 mm SVL).

PUBLISHED DESCRIPTIONS. Detailed descriptions of the external morphology of *Craugastor stadelmani* were done by the author and published by McCranie and Castañeda (2007) and McCranie and Wilson (2002). Unfortunately, the redescription of *Craugastor stadelmani* provided by Campbell (1994) was tainted because his sample included more specimens of *Craugastor fecundus* than it did of *Craugastor stadelmani*. The sources of those errors by Campbell (1994) were discussed by McCranie and Wilson (1997). A revision of the systematics of *Craugastor stadelmani* was proposed by McCranie and Wilson (1997); they used the taxonomy currently in place for *Craugastor stadelmani* and all remaining Honduran species of the *Craugastor milesi* species group as currently known for Honduras.

ILLUSTRATIONS. Color photographs of an adult were presented by Köhler (2011), McCranie and Castañeda (2007), McCranie and Wilson (2002), McCranie et al. (2010), and Wilson and McCranie (2004a). A **black-and-white photograph** of an adult was published by McCranie and Wilson (1997).

DISTRIBUTION. *Craugastor stadelmani* is known to occur from 1125 to 1900 m elevation in the Premontane Wet Forest and Lower Montane Wet Forest formations (see Holdridge 1967) in the western portion of the Cordillera Nombre de Dios in southwestern Atlántida, southward to Montaña de Pijol, in southwestern Yoro, and eastward to northwestern Olancho on the Atlantic versant of north-central Honduras.

FOSSIL RECORD. None.

PERTINENT LITERATURE. Relevant citations are listed by topic: **checklists and faunal lists** (Anonymous 2016; Campbell 1999; Campbell and Savage 2000; Espinal 1993; Espinal et al. 2001; Frost 2018; Gorham 1966; Heinicke et al. 2007; Holm and Cruz D. 1994;

Hutchins et al. 2003; Köhler 2011; Lynch 1965, 2000; Lynch and Duellman 1997; McCranie 2006, 2007, 2009, 2015; McCranie and Castañeda 2007; McCranie and Wilson 1999, 2002; McCranie et al. 1989, 2006; Meyer 1969; Meyer and Wilson 1971; Padial et al. 2014; Solís et al. 2014; Townsend and Wilson 2010, 2016; Wilson and Johnson 2010; Wilson and Townsend 2006, 2010; Wilson et al. 2001; Zhao et al. 1998), **comparisons to new species** (McCranie and Wilson 1997; Savage 2001), **conservation status** (Johnson et al. 2015; McCranie and Wilson 2004; Mitchell 2017; Stuart et al. 2008; Townsend et al. 2012; Wilson and McCranie 2003, 2004a, 2004b; Wilson and Townsend 2006, 2010), **identification keys** (McCranie and Castañeda 2007; McCranie and Wilson 1997, 2002), **taxonomy, systematics, and phylogenetics** (Frost et al. 2006; Lynch 2000; Padial et al. 2014), and **type specimen lists** (Barbour and Loveridge 1946; Marx 1958).

REMARKS. *Craugastor stadelmani* was a common frog along a small stream in northwestern Yoro in July–August of 1991 and 1993. A return trip to the same stream was made in July 1995, and despite four days and four nights of searching, no *Craugastor stadelmani* were seen (personal observations by the author). McCranie and Wilson (2002:440) wrote “Given that all streamside *Eleutherodactylus* [= *Craugastor*] from about 900 m elevation and higher apparently have disappeared recently from these habitats (even at still pristine localities) in Honduras, it is possible that [*Craugastor*] *stadelmani* may be extinct.” Despite this premature statement (see below), there are serious and undeniable problems challenging the long-term survival of *Craugastor stadelmani* and many other frogs occurring in Honduras. These problems are apparently the direct result of the relentless and expanding habitat destruction of the Honduran forests. The chytrid fungus *Batrachochytrium dendrobatidis* is hypothesized to also be contributing to survival problems for

many species of frogs, especially those of the *Craugastor milesi* and *Craugastor rugulosus* species groups in Honduras (see Whitfield et al. 2016 for a recent review of what is known about that fungus in northern Central American frogs, including those in Honduras; also see references cited in that work). However, the single *Craugastor stadelmani* tested to date for that fungus returned negative results (Gutsche et al. 2015).

Craugastor stadelmani has been classified as a species of high vulnerability, threatened, or declining in the publications listed above in Pertinent Literature under conservation status. Fortunately, along a small stream at a slightly higher elevation (1690 m) in the vicinity of the northwestern Yoro locality previously mentioned, two *Craugastor stadelmani* were seen in the afternoon and the night of 8 April 2010 (based on adult sizes, both appeared to be females; personal observations by the author). Those observations (see McCranie et al. 2010) were even more encouraging because, although mostly searching arboreal habitats, the author had previously worked along that small stream in September 2003 (see Castañeda and McCranie 2011) without seeing any *Craugastor*. Therefore, it is possible that *Craugastor stadelmani* has naturally populated or repopulated that stream in recent years. A short description of the vegetation and brief statements regarding that site were published by Castañeda and McCranie (2011).

However, despite the recent and encouraging discoveries, this author remains of the opinion that *Craugastor stadelmani* is a seriously threatened species with little chance of long-term survival unless the Honduran Government takes some drastic steps to stop the ongoing, out-of-hand habitat devastation currently occurring throughout the country.

ADDITIONAL VERNACULAR NAMES. “Ranita de Arroyo de la Montaña Norcentro” was used by McCranie and Castañeda (2007), which is a Spanish equivalent of the English

vernacular name suggested herein. “Stadelman’s Patterlove” was provided by Mitchell (2017); “Stadelman’s Coqui” was given by Beolens et al. (2013).

ETYMOLOGY. The name *stadelmani* is a patronym for Raymond E. Stadelman who collected the holotype of *Craugastor stadelmani* in 1934 (Schmidt 1936). Stadelman was a naturalist employed by the Museum of Comparative Zoology at Harvard University at the time he collected that holotype. Schmidt (1936:43) reported that the Stadelman MCZ Honduran collections contained “no less than ten new forms.”

COMMENTS. *Craugastor stadelmani* was placed in the synonymy of *Craugastor milesi* (both as *Eleutherodactylus*) by Lynch (1965) and Lynch and Fugler (1965). An attempt to recognize *Craugastor stadelmani* as a valid species was made by Campbell (1994). This was an important decision, however, the concept of *Craugastor stadelmani sensu* Campbell (1994) was instead a complex of two species, *Craugastor stadelmani* and *Craugastor fecundus* (see McCranie 2018).

The character states of lateral keels versus lateral fleshy fringes on the unwebbed portions of the toes were confused by Savage (2001) in several species of *Craugastor* of the *Craugastor milesi* species group described by McCranie and Wilson (1997). However, the confusion introduced by Savage (2001) resulted from data he collected during his work as an author on the McCranie et al. (1989) manuscript. The fact that the species and specimens in question were still considered as part of species complexes in 1989 should have been recognized subsequently by Savage (2001).

Craugastor stadelmani (as *Eleutherodactylus*) was identified as *Craugastor milesi* in world lists or in various faunal areas by either experts on that and closely related taxa and/or experts on those faunal areas (Gorham 1966,

1974; Lynch and Fugler 1965; McCranie et al. 1989; Meyer 1969; Meyer and Wilson 1971; Savage 1975; Schmidt 1933).

The suggestion that *Craugastor* Cope might be available as a subgenus or genus name for the complex of frogs containing the subsequently described *Craugastor stadelmani* (Lynch’s *Eleutherodactylus rugulosus* group) was made by Lynch (1986, 1993). *Craugastor stadelmani* was listed as belonging to the subgenus *Craugastor* by Lynch (2000). The use of *Craugastor* as a genus name was advocated by Savage (2002), but *Craugastor* was continued to be used as a subgenus of *Eleutherodactylus* by Crawford and Smith (2005). The subgenus name *Campbellius* was erected for the group of frogs containing *Craugastor stadelmani* by Hedges et al. (2008); however, several errors occur in their literature-based morphological description of that subgenus. The speculation that the subgenus *Campbellius* “will ultimately be considered” a genus was made by Padial et al. (2014). However, that bold speculation was based solely on genetic data available from only two of the 13 species included in that subgenus by Padial et al. (2014).

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JAMES R. MCCRANIE, 10770 SW 164 Street, Miami, FL 33157–2933 (jmccrani@bellsouth.net).

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